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THE

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COMMUNICATIONS, ORIGINAL AND SELECTED.

For the Belfast Monthly Magazine.

SINCE a knowledge of the method of ascertaining the Specific Gravity of bodies, is attended with so many and great advantages to the chymist, merchant, agriculturist and miner, I trust any attempts which may tend to simplify that process, and render it more generally known, will not be unacceptable to many of your readers.

Specific Gravity expresses the weight of any particular kind of matter, as compared with that of the same bulk of some other body of which the weight is supposed to be already known; pure or distilled water being easily procured, its temperature regulated with facility, and being then a fluid of uniform density, seems the least exceptionable for a standard of comparison, and is therefore generally used for that purpose; but as its weight varies with its temperature, that is usually taken at 60 degrees of Farenheit's thermometer.

To compare the bulk of fluids and observe the difference in their weight, is comparatively easy and simple; a small bottle may be filled with the fluid we wish to examine, and its weight compared with that of the same bulk of water. Thus, if a small flask hold 1000 grains of pure water, it will contain 1850 of oil of vitriol (sulphuric acid) and only 815 of spirit of wine (alcohol.)

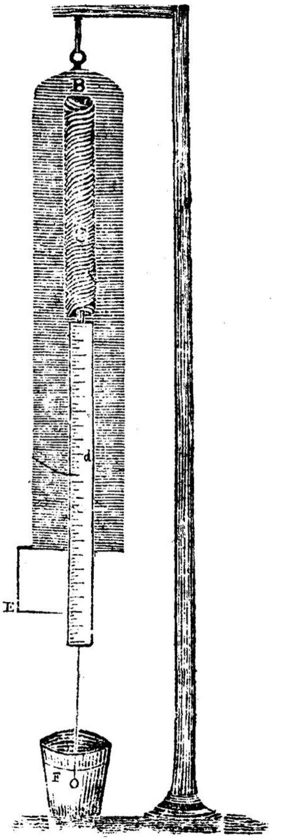
But to compare the weight of an irregular solid, with that of its bulk of a standard fluid, is a more difficult problem, and was considered impossible, previous to the discovery of the illustrious, but unfortunate Archimedes, who ascertained on the principles of hydrostatics, that a lighter, and less valuable metal had been substituted for part of the gold in King Hiero's crown; a discovery to which he was led, by observing the ascent of the water on the sides of the bath, when he immersed himself in it.

When a solid is immersed in a fluid, it is plain, that the former displaces its own bulk of the latter; now the weight of the portion of fluid displaced, may be known by observing the loss of weight, sustained by the solid on immersion, and this gives also a very easy method of taking the specific gravity of liquids; thus, if a body weigh 50 grains in air, and only 40 in water, the bulk of that body of water, weighs 10 grains (the difference) which 10 grains if made a divisor, and the 50 grains or weight in air a dividend, the quotient 5 will be the specific gravity of that body; or in other words a cubic inch (or any given measure) of the solid, compared in weight, with the fluid, stands in the proportion of 5 to 1. The relative weight of grain, sand, ore, powders, or soil of any kind, may be also ascertained in the following easy manner; take a small phial capable of holding a known quantity of water, and introduce into it, equal parts of sand (for example) and water; this may be done by pouring water into the vessel, till it be half full, and then adding as much sand, as will make the water rise in the bottle so as to fill it, the difference between the weight of the water and sand, will give the result; thus if the phial contains 100 grains of pure water, and gains 50 grains by having the half of that water displaced, by an equal bulk of sand, it is evident, that the weight of the sand will be to that of water, as 2 to 1. Salts may be weighed in the same manner, in some fluid, in which they are not soluble, such as oil of turpentine, or naphtha.

If therefore there be a variety of substances, the respective value of which are in any ratio, whether inverse, or direct, connected with their weight, by this simple procedure, we discover their comparative goodness. The purity of various medicines, may be in this manner determined, so that this rule is evidently of infinite use in pharmacy; yet where is the Pharmacopolist, who understands, or uses an hydrostatic balance? The value of barilla, kelp, pot, and pearl ashes, (so closely connected with our staple manufactures) may be readily found in this way, as well as the value of oil of vitriol, which is at present prepared by the rules of commerce, of a particular standard strength; so that if a person purchase it below the standard specific gravity, he may return it to the manufacturer, or deduct a sum from its price, equivalent to its want of weight.

In agriculture there can be no doubt of the universal and important application of this rule, not only in ascertaining the comparative value of different samples of the same kinds of grain, roots, &c. but also that of lime, marle, and some other manures; thus if pure lime be of greater value, than any admixture of that earth with clay, sand, iron, &c. the nearer the stone which we use approaches to the specific gravity of pure carbonate of lime (chalk, marble, or good lime-stone) the greater will be the price, at which the farmer can afford to purchase it. No doubt the fertility and composition of different soils, could also be investigated in this way, but this view of the subject has not yet I believe been proposed or practised; at least, not in this country.

In mining and mineralogy the rule being universally admitted, and applied, I think I need not exemplify its use; suffice it to say, that in the British Mineralogy, now publishing with so much credit, and expense, by Sowerby, the generic characters of all the fossils, are traced to their specific gravities: to this extraordinary work I may refer the reader for the best account of the specific gravity of British minerals; even the comparative value of different species of coal, may, I conceive, be readily ascertained by finding their specific gravity, which if simplified according to the following method, may be easily applied by any careful domestic.



The method of weighing the body to be examined, has I think been hitherto rather objectionable, for from the length of time necessary in adjusting the weights, or the balance, the result of the process, will be often inaccurate, when the body immersed in the water imbibes that fluid, or is partially soluble or diffusible in it; a consideration of this, and of the difficulty, expense and loss of time attending a method so tedious, and operose, induced me to form the instrument represented in the plate, contrived like the pocket-steel-yard (or ouncel) on the principle of the spring, but that so delicate, as to be sensible to the weight of one fourth of a grain. It is used in the following manner. The body to be weighed, is suspended by a fine gold wire or common hair, to the graduated slide, d, attached to the spiral wire or spring C. The slide is immediately drawn down, so as to show the number of grains opposite the point of the index E. This being the weight under the pressure of the atmosphere is noted, the body O, still suspended at the slide is then plunged into a proper vessel F, filled with the standard fluid, part of the weight being thus taken off, the spring retracts and shows in an instant the loss of weight.

For taking the specific gravity of fluids this instrument is also very convenient; a piece of glass, of known weight, suspended at the spring, and immersed in the liquor, shows instantly the proportion of weight, one fluid bears to another. Now as the strength of spirits, and various commodities increases inversely as their weight, I would beg leave to recommend this mode of examining them, to the attention of the spirit-merchant, and the public in general; not from any desire of ostentation, but from the conviction of proposing a simple, cheap, and speedy method which any one may easily understand, and improve. This instrument so plainly adapted to all those purposes, may be constructed for a few shillings; the principal point is to use a spiral wire, or spring, of a determinate kind, the diameter, weight, and elasticity of which shall be uniform.

J. MURRAY, Surgeon.

Church-street, Jan. 26, 1809.

For the Belfast Monthly Magazine.

ON ORIGINALITY OF THINKING, AND THE FASHIONABLE CHANGES OF PUBLIC OPINION.

IF fashion confined its influence to the cut of a coat, the size of a hat, or the variations of female dress, it might often be preposterous without producing much injury; but when it attempts to control opinions, and form them to one model, in such instances, its "ideot sway" should be resisted. Originality of thinking, or an independence of judgment is a rare qualification: so rare indeed, that some have attempted to libel human nature, by asserting that the multitude are incapable of forming deliberate opinions, and only fitted to follow in the train of a few, who are privileged to think for them. The people have brought this opprobrium on themselves, because by not exerting this privilege of forming a deliberate judgment they appear to superficial observers, who argue from the disuse against the existence of this faculty, as if they did not actually possess the power, or the right of private judgment. They too implicitly follow a few leaders of public opinion, and receive the *tone* from them, while if the capability of such directors who take the lead were critically examined, their qualifications might justly be called in question. At the era of the reformation, Lutheranism was fashionable in one place and Calvinism in another, while the old fashion continued to prevail in other places, and thus the perception of truth might be supposed to be influenced by geographical circles. We cannot suppose if the people had individually examined for themselves, that opinions would be so generally embraced, as if they were nationally decided on. The influence of sects over their respective adherents may also be adduced to prove the force of fashion over opinion. Most remain in the profession in which they were educated, without confirming their assent by future examination, or expressing their dissent by separating from what their matured opinions may lead them to think erroneous. The exercise of private judgment too often lies dormant.

I am not an old man, and yet I have known many fluctuations of public opinion. My first acquaintance with public life commenced during the American war. I well remember the agitated politics of those days, and the two rival modes of thinking then in vogue. In Ireland this was the grand era of volunteer associations. The accents of patriotism were then fashionable, but that these sentiments were in compliance with the mode, and not in the million, the result of